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Christian Schmidt

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EXAMINER

JENNISON, BRIAN W

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3742

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/594,991	Applicant(s) SCHMIDT, CHRISTIAN	
	Examiner BRIAN JENNISON	Art Unit 3742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-74 is/are pending in the application.
- 4a) Of the above claim(s) 52-74 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-51 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/29/2006, 12/21/2006</u> . | 6) <input type="checkbox"/> Other: ____. |

Election/Restrictions

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1-51, drawn to a method of forming a structure by providing a substrate, applying a voltage, applying heat to the substrate, using an electronic feedback mechanism to apply voltage.

Group II, claim(s) 52-67, drawn to a device.

Group III, claim(s) 68-74, drawn to a substrate produced.

The inventions listed as Groups I-III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Group II contains all the elements of Group I including two electrodes which are known in the art from Cross et al (US 4,777,338). This special technical feature is known in the art and is not included in Group I or III. Group I does not include the array of substrates as in Group III. The process of group I is also known in the art from Cross et al.

2. During a telephone conversation with Morey Wildes on 3/13/2009 a provisional election was made without traverse to prosecute the invention of group I, claims 1-51.

Affirmation of this election must be made by applicant in replying to this Office action.

Claim 52-74 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

3. The examiner has required restriction between product and process claims.

Where applicant elects claims directed to the product, and the product claims are subsequently found allowable, withdrawn process claims that depend from or otherwise require all the limitations of the allowable product claim will be considered for rejoinder.

All claims directed to a nonelected process invention must require all the limitations of an allowable product claim for that process invention to be rejoined.

In the event of rejoinder, the requirement for restriction between the product claims and the rejoined process claims will be withdrawn, and the rejoined process claims will be fully examined for patentability in accordance with 37 CFR 1.104. Thus, to be allowable, the rejoined claims must meet all criteria for patentability including the requirements of 35 U.S.C. 101, 102, 103 and 112. Until all claims to the elected product are found allowable, an otherwise proper restriction requirement between product claims and process claims may be maintained. Withdrawn process claims that are not commensurate in scope with an allowable product claim will not be rejoined. See MPEP § 821.04(b). Additionally, in order to retain the right to rejoinder in accordance with the above policy, applicant is advised that the process claims should be amended during prosecution to require the limitations of the product claims. **Failure to do so may result in a loss of the right to rejoinder.** Further, note that the prohibition against double patenting rejections of 35 U.S.C. 121 does not apply where the restriction requirement is withdrawn by the examiner before the patent issues. See MPEP § 804.01.

Claim Analysis

It has been held that the recitation that an element is "capable of" performing a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchison*, 69 USPQ 138.

Claim 8 recites "voltage analysis circuit being capable of controlling voltage supply output parameters or said energy or heat source." These limitations are not given patentable weight.

It has been held that to be entitled to weight in method claims, the recited structure limitations therein must affect the method in a manipulative sense and not amount to the mere claiming of a use of a particular structure (Ex. Parte Pfeiffer, 1962 C.D. 408 (1961))

Claim 12 is not given patentable weight since the term provides for does not include a step in the method, it is merely stating what the device does.

Claims 41-42 merely recite the diameter of a hole and do not involve a step in a method.

Claims 27, 39 recite "sufficient to." It has been held that an element is "sufficient" to perform any given function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense.

~~Claim 28 is not given patentable weight since it depends on claim 27.~~

Specification

4. The use of the trademark Teflon has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Claim Objections

5. Claim 26 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 22 requires the steps to be carried out using AC voltage, therefore step c) is already carried out using AC voltage.

6. Claim 29 is objected to since it depends on claim 26.

7. Claim 20 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 1 requires dielectric breakdown. Since claim 20 removes this requirement the scope of the claims become broader, failing to further limit the claim.

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8. Claim 28 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 1 requires step c). Since claim 28 removes this requirement the scope of the claims become broader, failing to further limit the claim.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1-51 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely

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exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949).

12. In the present instance, claim 1 included many occurrences of “preferably” which render the claim since the resulting claim does not clearly set forth the metes and bounds of the claim and it is also unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d)

13. In the present instance, claims 2-3 recites the broad recitation factor of 2, and the claim also recites preferably being at least one order of magnitude which is the narrower statement of the range/limitation.

14. In the present instance, claim 4 recites the broad recitation threshold value; increase in electric current, and the claim also recites preferably in the range of 0.01 to 10mA, preferably equal or larger than 0.01A/s which is the narrower statement of the range/limitation.

15. In the present instance, claim 5 recites the broad recitation 1 ns to 100ms, and the claim also recites preferably 1 ns to 100us, 100 ns to 10 us which is the narrower statement of the range/limitation. The latter case also fails to further limit the first case since 10 ns is greater than 1 ns.

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16. In the present instance, claim 10 recites the broad recitation step c) is performed under control of a user, and the claim also recites preferably by use of said electronic feedback mechanism which is the narrower statement of the range/limitation.

17. In the present instance, claim 11 recites the broad recitation said energy, and the claim also recites heat which is the narrower statement of the range/limitation.

18. In the present instance, claim 13 recites the broad recitation 10^2 V- 10^6 V, and the claim also recites preferably 10^3 V- 10^5 V which is the narrower statement of the range/limitation.

19. In the present instance, claim 16 recites the broad recitation placement of electrodes at or near said region, and the claim also recites preferably placing one electrode on one side of the substrate... which is the narrower statement of the range/limitation.

20. In the present instance, claim 19 recites the broad recitation removal of substrate material, and the claim also recites preferably by evaporation... which is the narrower statement of the range/limitation.

21. In the present instance, claims 24 and 40 recites the broad recitation 10^2 Hz- 10^{12} Hz, and the claim also recites preferably 5×10^2 Hz- 10^8 Hz more preferably 10^3 Hz- 10^7 Hz which is the narrower statement of the range/limitation.

22. In the present instance, claim 25 recites the broad recitation intermittently, and the claim also recites preferably pulse trains which is the narrower statement of the range/limitation.

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23. In the present instance, claim 25 recites the broad recitation 1 ms to 1000ms, and the claim also recites preferably 10ms to 500ms which is the narrower statement of the range/limitation.

24. In the present instance, claim 31 recites the broad recitation neighboring structures, and the claim also recites preferably neighboring holes which is the narrower statement of the range/limitation.

25. In the present instance, claim 37 recites the broad recitation by electrodes, and the claim also recites preferably at least one electrode being placed on one side... which is the narrower statement of the range/limitation.

26. In the present instance, claim 41 recites the broad recitation 0.01um to 50um, and the claim also recites preferably 0.1um to 10um more preferably 0.3um to 5um which is the narrower statement of the range/limitation.

27. In the present instance, claim 44 recites the broad recitation greater than 1, and the claim also recites preferably greater than 5 which is the narrower statement of the range/limitation.

28. In the present instance, claim 44 recites the broad recitation said structure, and the claim also recites preferably said hole which is the narrower statement of the range/limitation.

29. In the present instance, claim 46 recites the broad recitation 10nm to 10mm, and the claim also recites preferably 10um to 1mm more preferably 10um to .5mm, most preferably >10 microns which is the narrower statement of the range/limitation.

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30. In the present instance, claims 48-49 recites the broad recitation application of heat, and the claim also recites preferably by application of heat through step c which is the narrower statement of the range/limitation.

31. In the present instance, claim 50 recites the broad recitation two electrodes, and the claim also recites preferably two electrodes which are used in performing step c) which is the narrower statement of the range/limitation.

32. In the present instance, claim 51 recites the broad recitation absence of additional heat or energy, and the claim also recites preferably using voltage below 10kV and wherein step c) is omitted altogether which is the narrower statement of the range/limitation.

33. Claim 45 is rejected as being indefinite due to the use of the trademark Teflon. The composition of Teflon may change over time, this fact renders the claim indefinite since it does not specifically set forth what compositions are included in the claim.

Any claims of the claims 2-51 not discussed above are rejected since they depend upon claim 1.

34. Regarding claims 8, 27, 35, 45, the phrase "such as" or "for example (e.g.)" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

35. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

36. Claims 1-2, 5-20, 32-35, 41-44, 46-50 are rejected under 35 U.S.C. 102(b) as being anticipated by Cross (US 4,777,338) as cited by applicant.

Cross teaches:

Regarding Claim 1: A method of forming a structure, preferably a hole or cavity or channel, in a region of an electrically insulating substrate, **(A perforation in a film is made. See Column 2, Lines 64-68.)** comprising the steps:

- a) providing an electrically insulating substrate, **(the film is provided in Fig 1)**
- b) applying, by means of a voltage supply, a voltage across a region of said electrically insulating substrate, said voltage being sufficient to give rise to a significant increase in electrical current through said region and to a dielectric breakdown (DEB) through said region, **(A voltage supply 36 applies an electric pulse or current causing dielectric breakdown of the film. See Column 3, Lines 5-10.)**
- c) applying energy, preferably heat, to said substrate or said region only so as to increase the temperature of said region, said energy, preferably heat, originating either from an energy or heat source or from components of said voltage applied in step b), said energy, preferably heat, being applied so as to reduce the amplitude of voltage

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required in step b) to give rise to said current increase and/or to soften the material of said region, **(Heat is generated by the current applied to the electrodes from the power supply which soften the material. See Column 4, Lines 35-40. The high temperature bath also allows for heating. See Column 3, Lines 39-45.)**

wherein step b) is performed and, preferably, ended using an electronic feedback mechanism operating according to user-predefined parameters, said electronic feedback mechanism controlling the properties of said applied voltage and/or of said electrical current. **(The trigger circuit 42 is an electronic feedback mechanism which controls the voltage and current.)**

Regarding Claim 2: This is merely an increase in current as defined by the definition of current. Dielectric breakdown is caused by the increase in current and voltage in the electrode from the trigger 42 during a predefined period of 1 microsecond or less. **See Column 3, Lines 50-55.**

Regarding Claim 5: The trigger circuit is capable of ending the voltage and current supplied in 100ns to 10us after dielectric breakdown.

Regarding Claim 6: The pulse occurs for 1 micro second and then the step of applying voltage and current ends when the pulse ends. **See Column 6, Lines 40-45.**

Regarding Claim 7: The pulse is controlled by the trigger circuit and occurs without user intervention. **See Column 5, Lines 8-12.**

Regarding Claim 8: The feedback mechanism is a trigger circuit 42 and is capable of controlling voltage.

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Regarding Claim 9: The heat from the water and the voltage are applied at the same time.

Regarding Claims 10-11: These claims simply make the method non automatic and may be done by turning a knob or changing the circuit which involves a user.

Regarding Claim 12: The trigger circuit regulates the duration and frequency of voltage. **See Column 5, Lines 9-11.**

Regarding Claim 13: The voltage is 15,000V. **See Column 4, Line 44.**

Regarding Claim 14: The heat of the bath is applied before the voltage. **See Column 3, Lines 39-45.**

Regarding Claim 15: The film is in the heated water bath after the current is applied. **See Column 4, Lines 35-40.**

Regarding Claim 16: Fig 1 shows the electrodes being placed on opposite sides of the substrate.

Regarding Claim 17: The voltage is increased so that dielectric breakdown and spark gaps occur. **See Column 5, lines 15-25.**

Regarding Claim 18: The current flows from electrode to electrode causing dielectric breakdown which would change the stiffness or brittleness of the substrate. **See Column 5, Lines 15-25.**

Regarding Claim 19: The discharge melts part of the substrate. **See Column 1, Lines 10-15.**

Regarding Claim 20: No unintended breakage of the substrate occurs.

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Regarding Claim 32: the water bath provides heat and the power consumption is reduced, Meaning voltage amplitude is reduced. **See Column 4, Lines 15-20.**

Regarding Claim 33-34: When voltage is applied to the electrode it creates heat on the substrate. The conductors 19 can be considered heated filaments since the current pass through them will cause them to heat up.

Regarding Claim 35: The water bath is considered and external heat source.

Regarding Claims 41-42: The hole has a diameter of 50 microns. **See column 6, Lines 5-10.**

Regarding Claim 43: The perforations are formed in channel like structures. The film is moved along the electrode, therefore the electrodes are moved relative to the film. **See Column 6, Lines 5-10.**

Regarding Claim 44: The hole is 50 microns in diameter and the depth is 1 mm given the structure and aspect ratio of greater than 5. **See Column 6, Lines 5-10.**

Regarding Claim 46: The thickness of the region is 1mm, which is greater than 10 microns. **See Column 6, Lines 5-10.**

Regarding Claim 47: The substrate is in a conductive liquid, water, which reacts with the surface during the process to facilitate dielectric breakdown. **See Column 3, Lines 35-45.**

Regarding Claim 48: The water bath facilitates smoothing of the surface since the temperature is increased to shrink the hole. **See Column 6, Lines 5-10.** The erosive properties of water will also smooth the surface.

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Regarding Claim 49: The diameter of the hole is changed through an increase in temperature of the heated water. **See Column 6, Lines 5-10.**

Regarding Claim 50: Any electric arc created by the two electrodes in Fig 1 will give off heat and will facilitate the heating of the substrate. **See Column 5, Lines 25-30.**

Claim Rejections - 35 USC § 103

37. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

38. Claims 3-4, 21-30, 36-40, 45, 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cross in view of Davies et al (US 3,760,153.)

The teachings of Cross have been discussed above.

Cross also teaches:

Regarding Claims 24, 40: The time the pulse is applied is 1 microsecond giving it a frequency of 1×10^6 Hz. **See Column 6, Lines 40-45.**

Regarding Claims 36-38: Heat is applied by the electrode since it is dissipated when voltage is applied. Fig 1 shows the electrodes 60, 62 being places on opposite sides of the substrate.

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Regarding Claim 39: Dielectric breakdown from voltage application. **See Column 3, Lines 5-10.**

Regarding Claim 29: When dielectric breakdown occurs the temperature in the region of the breakdown will increase.

Regarding Claim 30: Any increase of current will cause the path to be a more direct line.

Cross fails to teach:

Regarding Claim 3: The method wherein said significant increase in electrical current is an increase in the number of charge carriers per unit time, by a factor of 2, preferably by at least one order of magnitude.

Regarding Claim 4: The method according to claim 2, wherein said electronic feedback mechanism causes said end of step b) to occur--with or without a preset delay--at the time when said electrical current has reached a threshold value, preferably in the range of 0.01 to 10 mA, or at the time, when an increase in electrical current, (dI/dt) , has reached a threshold value, preferably equal or larger than 0.01 A/s.

Regarding Claim 21: The method according to claim 1, wherein said applied voltage is purely DC.

Regarding Claim 22: The method according to claim 1, wherein said applied voltage is purely AC.

Regarding Claim 23: The method according to claim 1, wherein said applied voltage is a superposition of AC and DC voltages.

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Regarding Claim 24: The method, wherein the frequency of said applied AC voltage is in the range...

Regarding Claim 25: The method, wherein said AC voltage is applied intermittently, preferably in pulse trains of a duration in the range of from 1 ms to 1000 ms, preferably 10 ms to 500 ms, with a pause in between of a duration of at least 1 ms, preferably of at least 10 ms.

Regarding Claim 26: The method, wherein said applied AC voltage is used for performing step c).

Regarding Claim 27: The method according to claim 22, wherein said applied AC voltage has parameters (e.g. amplitude, frequency, duty cycle) which are sufficient to establish an electric arc between a surface of said substrate and said electrodes.

Regarding Claim 28: The method according to claim 27, wherein said electric arc is used for performing step c).

Regarding Claims 29, 30, 36, 37, 39-40: AC voltage

Regarding Claim 45: The method according to claim 1, wherein said electrically insulating substrate is selected from a group comprising carbon-based polymers, such as polypropylene, fluoropolymers, such as Teflon, silicon-based substrates, such as glass, quartz, silicon nitride, silicon oxide, silicon based polymers such as Sylgard, semiconducting materials such as elemental silicon.

Regarding Claim 51: The voltage applied is 10kV and may drop to 300V without additional heating.

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Davies et al teaches:

Regarding Claims 3 and 4: The current at breakdown is 0.5 amps and decays to 10^{-12}

A which means the current is increased at least one order of magnitude. **See Column 7, Lines 40-43.**

Regarding Claim 25: A discharge time of 50 milliseconds, which is at least 10ms. **See Column 7, Lines 14-15.**

Cross discloses the claimed invention except for the current increases and duration. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to increase the current by a certain order of magnitude and for a certain duration since Davies teaches increasing a current to a certain value for ending a step and maintaining the pulse for 50 milliseconds, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. (In re Aller, 105 USPQ 233.)

Regarding Claims 21-23, 36, 37, 39-40: AC or DC voltage may be used as well as DC superpositioned on AC. **See Column 3, Lines 30-35.**

Regarding Claim 26: Since AC is used throughout the process it will also be used when heat is applied.

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Cross discloses the claimed invention but fails to specify AC or DC. It would have been obvious to one of ordinary skill in the art to use AC, DC or both since Davies et al teaches it is known in the art that AC and/or DC may be used to supply power.

Regarding Claims 27-28: The arc is created for 8 milliseconds and would also create an energy which is applied to the substrate during the arc. **See Column 7, Lines 25-30.**

Cross discloses the claimed invention except for AC parameters for creating an arc. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to create an AC current to establish an arc, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. (In re Aller, 105 USPQ 233.)

Regarding Claim 31: The arc is created every 4 milliseconds and has a certain frequency to create holes at a specific distance. If the time of the frequency of the arc is increased the arc will occur more frequently and the holes will be spaced closer together. This is simply a design choice and can be realized using simple calculations.

Cross discloses the claimed invention except for increasing the frequency of the arc. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to increase the frequency of the arc to minimize the distance between the

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holes, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. (In re Aller, 105 USPQ 233.)

Regarding Claim 45: The substrate may be a polyester film which is a carbon based polymer. **See Column 7, Lines 43-46.**

Cross discloses the claimed invention except for a carbon based polymer substrate. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a polyester film substrate as taught by Davies et al, since it has been held to be within the general skill the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

Regarding Claim 51: The voltage applied is 10kV and may drop to 300V without additional heating.

Cross discloses the claimed invention except for the voltage being 10kV as taught by Davies et al. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to us a voltage of 10kV, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. (In re Aller, 105 USPQ 233.)

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIAN JENNISON whose telephone number is (571)270-5930. The examiner can normally be reached on M-Th 7:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tu Hoang can be reached on 571-272-4780. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BRIAN JENNISON/
Examiner, Art Unit 3742

3/26/2009

/TU B HOANG/
Supervisory Patent Examiner, Art Unit 3742